The Network As a Digital Utility

Voice Video & Data Convergence

Brief's Objectives

- Identify the importance the fleet puts on cutting down the number of voice, video and data stovepipes that now exist in the afloat infrastructure
  - Given redundancy & reliability is built in, does the fleet want to need the SYSCOMs to converge these pipes?
- Gain Fleet endorsement of NIIN as Approach for Delivering Network Services on a Multimedia Network Backbone.
  - VV&D as a first step, followed by HM&E apps and

Outline

- Functional Requirements
- The Current Situation
- Changing Course
  - An Envisioned End-State & a cross-SYSCOM Alliance
    - Design objectives achieved under the auspices of HI
- Conceptual Architectures, the Pros and Cons
- Solicit fleet input on decision to proceed

Functional Requirements

- “The Integrated Shipboard Network System (ISNS) will transition existing networks installed aboard afloat units and within transportable C4I shelters into a centrally managed and configuration controlled naval intranet information infrastructure.”
- “Provide a robust LAN infrastructure supporting growth and migration to new technologies and capable of transporting voice, video and data throughout a shipboard environment”.
- “LAN infrastructure will include a routing mechanism to enable connection to available communication resources and information warfare protection products to ensure security and availability of information”.

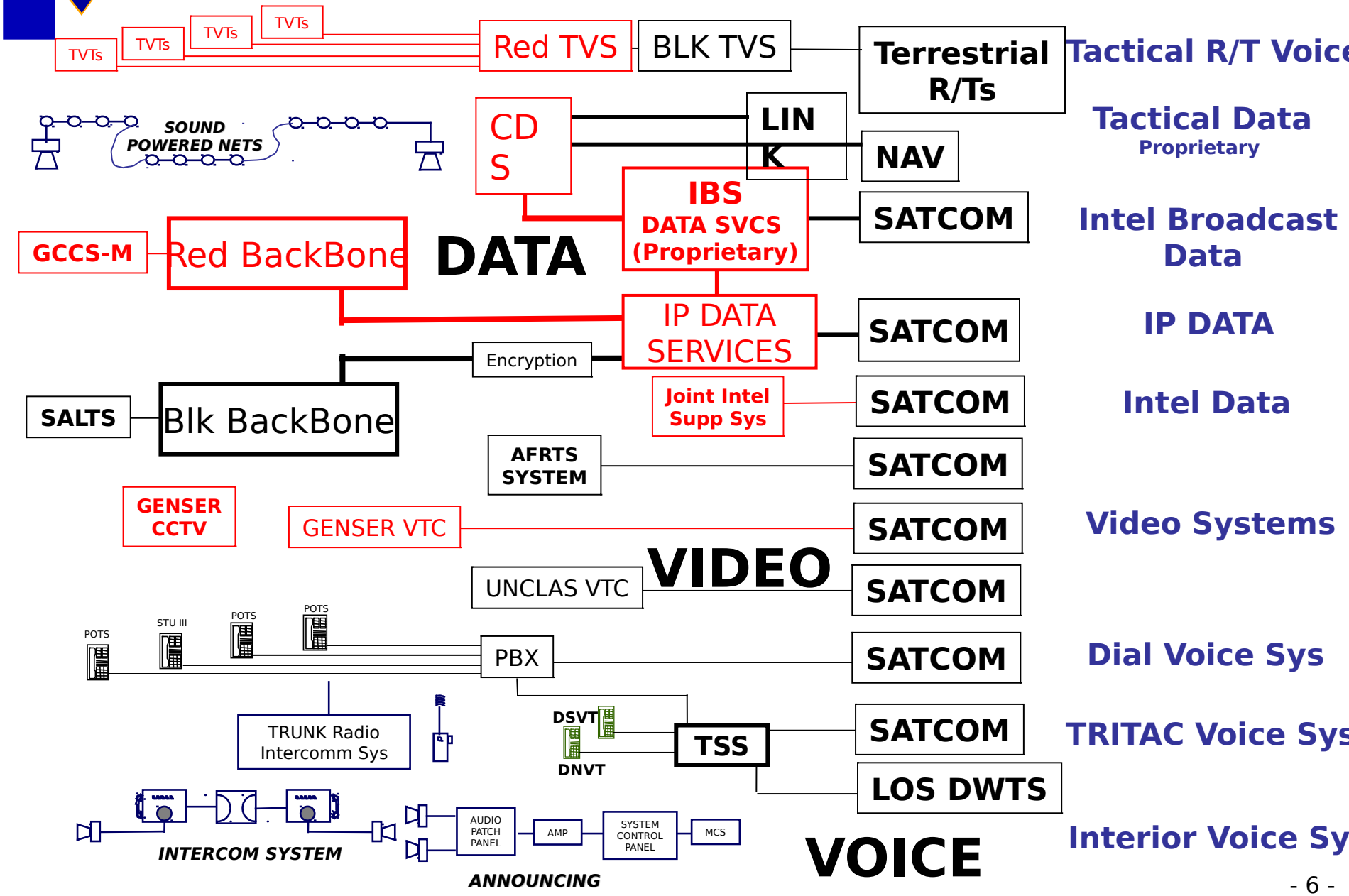
ADNS for WAN has similar voice, video and data transport functional requirements.

Current Situation

- SCN (& RCOH):
  - ICAN (CVN 68, 69, 76)
  - SWAN (LPD 17 Class)
  - Smart Ship
  - Hull/Class specific
- FMP:
  - Multiple infrastructure installed by SYSCOMs and TYCOMs
    - each install accompanied by separate logistic and training ‘tail’

STOVEPIPES means TOC (more tail means less tooth)

Stove Piped Systems Example



Where to Go from Here??

Convergence Developmental Approach

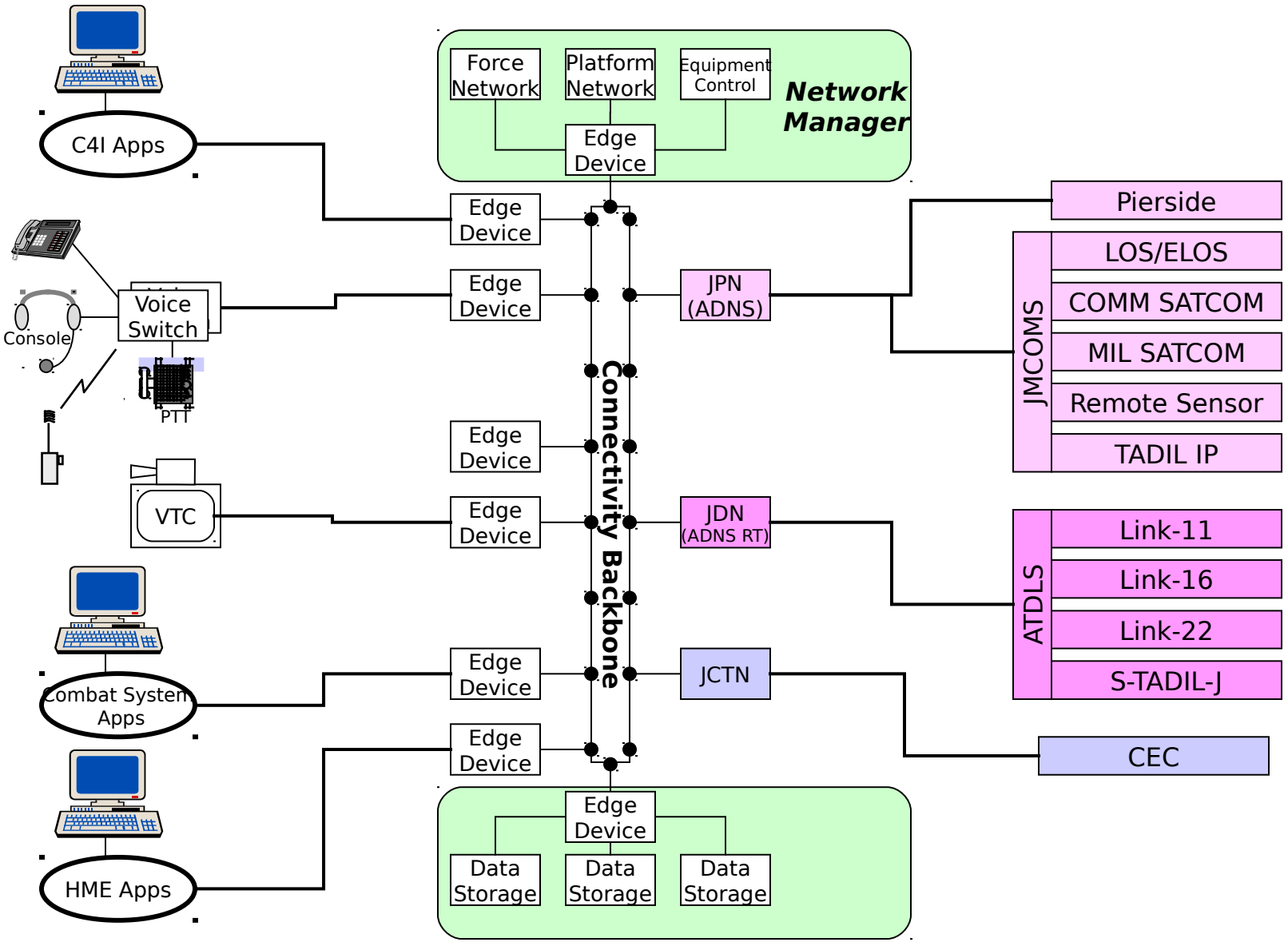
- Reuse & modify the existing network design components to maximum extent possible
  - minimize the number & costs of upgrades and documentation changes required
  - minimize growth of the logistic tail
- Define a goal architecture and determine the steps to achieve the goal
  - adopt a two year, incremental design, build, deliver strategy
  - align with the Horizontal Integration's design, build, deliver timeline

Naval Integrated Information Networks (NIIN) Charter

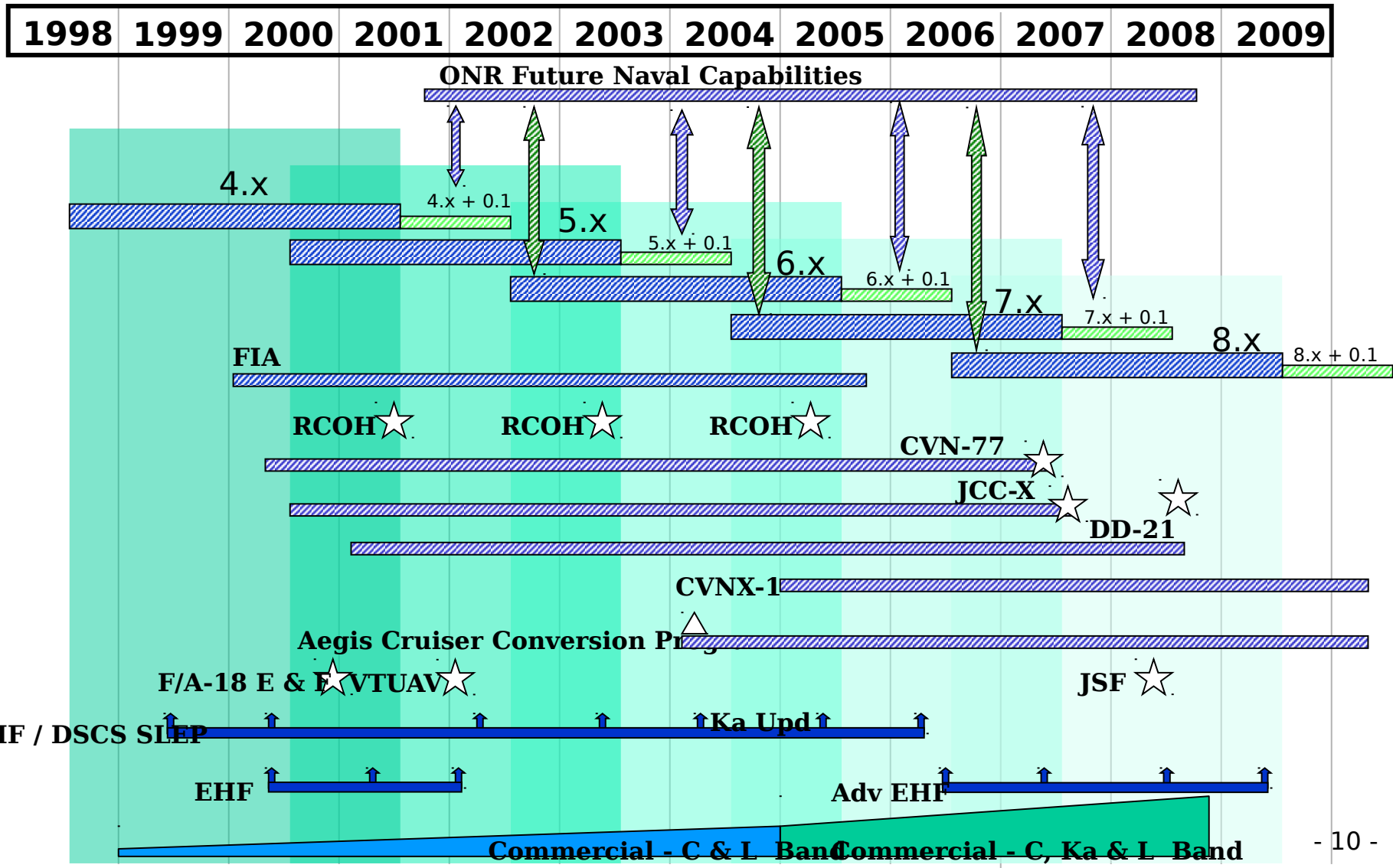
Proposed cross-SYSCOM Alliance

- Establish an architecture and detailed design for integrated shipboard networks.
  - The desired outcome is that every platform has one scaleable, reliable, maintainable, logically integrated network providing all required services.
- NIIN Deliverables:
  - Migration roadmap
  - Future Class Baselines (FCBs)
    - addresses FOCP, hardware, physical / logical topologies
    - Class specific working groups
- **Advisory only**
  - **authority through EA networks**

What's the Envisioned End-State



Major HI Drivers / Targets



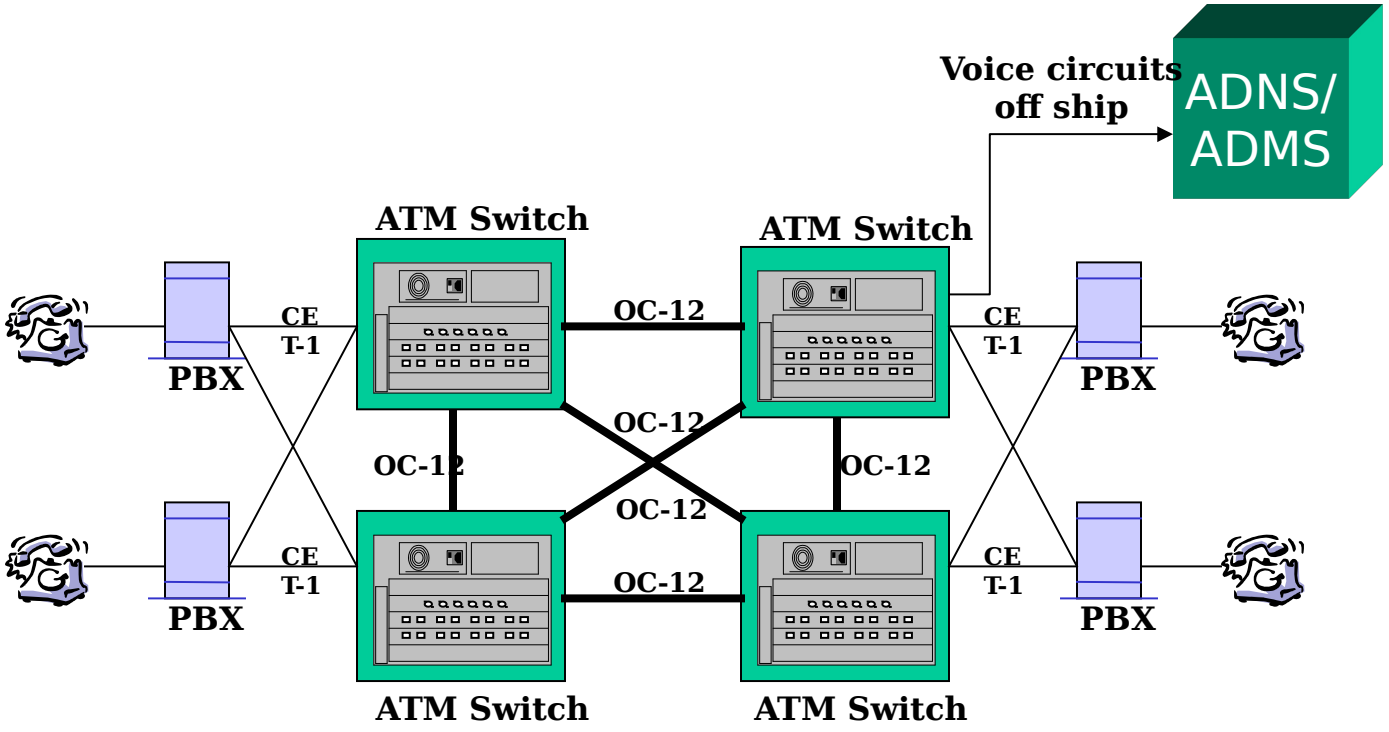
Convergence Questions & Success Criteria

SYSCOM Design/Build "Gates"

- The degree to which fleet identified functional objectives are satisfied and design objectives are achieved
- Technical readiness & availability of the source-to-sink solution
  - What is the state and future of ATM?
  - How and where does GbE fit into the solution set??
  - Ability to incrementally cut-over select time domain multiplexed services
- Affordability of ISNS/ADNS/NOC (STEP site & ADMS) change proposal
  - R&D, OPN, OM&N cost estimate comparison
- Reliability, maintainability and ILS impact

VV&D H.I. 4.x architecture

Incremental Build#1 : Intra-ship is threshold, off-ship is stretch goal



Pros/Cons

for Incremental Build# 1

- Pros (intra-ship)
  - first step towards Network as a Digital Utility
  - increased reliability by dual homing PBXs through ATM network
  - preserves PBX & OC-12 investment
  - mature technology with low implementation cost
- Pros (off-ship)
  - given existing bandwidth, provide on demand vs dedicated off-ship communications
  - select, contributing technology is less mature but lab proven (taclane availability in time for the 4.x design, build, delivery is a question)
- Cons
  - Additional unit costs for installation

Assumptions/Risks

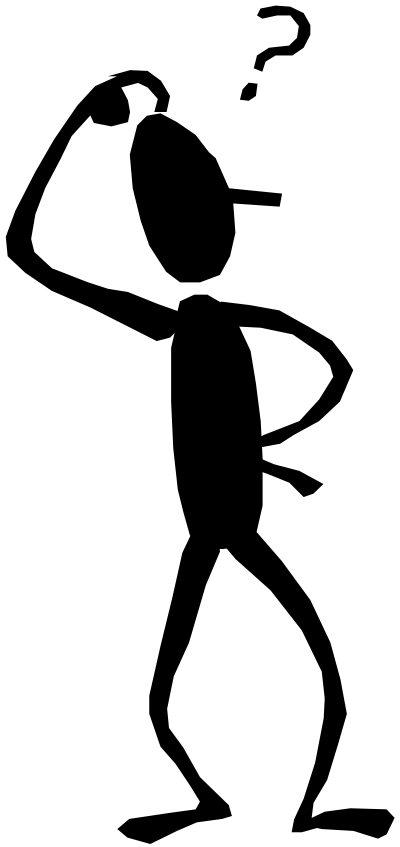
- Intra-ship upgrade = low risk
  - ATM circuit emulation is a proven technology
  - PBXs remain the same (currently installed)
  - No recabling to handset required
- Off-ship upgrade = moderate risk
  - Taclane V1.0 delivery in Feb/Mar’00
  - NCTAMS & STEP site modifications & coordination

Summary Points

What CNO & SPAWAR needs now !

- CINCs needs to identify the relative importance the fleet puts on this candidate development & delivery effort
- Proposed alignment with 4.x, 5.x and 6.x needs fleet & OPNAV sponsorship

Questions & Comments



Backup Slides

ISNS RTM

Req. ID	Operational Requirement	Functional Requirement	FY	Traceability/ Operational Impact
1.1	General : Network Transitions	The Integrated Shipboard Network System (ISNS) will transition existing networks installed aboard afloat units and within transportable C4I shelters into a centrally managed and configuration controlled naval intranet information infrastructure.		ORD section 1, par. 1
1.2	General: LAN, INM, BNIDS	Use Local Area Networks (LAN) infrastructure, Network Management Services, and Basic Network Information Distribution Services (BNIDS) to achieve its requirements.		ORD section 1, par. 1
1.3	General: System Support	Provide network services infrastructure for the following systems: ACDS, AADS, BGPHES, CCSC, CCSS, Combat DF, COBLU, CUB, GCCS-M, JMCIS (afloat, ashore, and tacmobile), NEKMS, OUTBOARD, SSEEE, TACINTEL II, PBX's.		ORD section 1, par. 2
1.4	General: GCCS-M, NTCSS	Integrate the existing capabilities provided by GCCS-M and NTCSS.		ORD section 1, par. 2
1.5	General:			
1.6	General:			
2.1	LAN Infrastructure: Growth and [illegible]gration	Pro[illegible]e a ro[illegible]st LAN infrastructure supporting growth and migration to new technologies an[illegible]capable o[illegible]ransporting voice, video and data throughout a shipboard environment.		ORD section 4.a.1
2.2	LAN Infrastructure: Voice, Vide, Data to [illegible] Desktop	W[illegible]e respo[illegible]ble for providing integrated voice, video, and data services to the desktop.		ORD section 4.a.1.a
2.3	LAN Infrastructure: Routing	LAN in[illegible]structure wil[illegible]de a routing mechanism to enable connection to available commu[illegible]ation res[illegible]ces [illegible]d information warfare protection products to ensure security and availabi[illegible]y of in[illegible]mation		ORD section 4.a.1
2.4	LAN Infrastructure: Architecture Standards	Shall su[illegible]ppo[illegible]dards [illegible]ch as Swi[illegible] Ethernet, Switched Fast Ethernet, SONET, ATM, UNI 3.1 fo[illegible]ATM, [illegible]A for ATM, PNN[illegible]ase 1 for ATM. ISNS will also use scalable architecture/backbone i[illegible]uding 1[illegible]FX for Unit[illegible]vel ships and OC-12 for Force Level Ships.		ORD section 4.a.1.b - c
2.5	LAN Infrastructure:			
2.6	LAN Infrastructure:			
3.1	Technical Control and Integrated Network Management Services (TCINM): Connectivity	Provide timely, seamless, and secure connectivit[illegible]or voice, video, and data applications to current and future NAVY RF links and pierside [illegible]nnectivity.		ORD section 4.a.2
3.2	TCINM:			
3.3	TCINM:			
3.4	TCINM:			
4.1	Basic Network Information Distributed Services / Network Services (BNIDS/NS): Applications	Will organize the network and provide fundamental applications that all users in all functional areas require.		ORD section 4.a.3
4.2	BNIDS/NS: General Services	ISNS includes the configuration of the network and network devices to establish node, user and device identification, system domain establishment, a routing or switching schema to move information to its final destination, security services, directory services, e-mail including attachments, electronic dialog (chat),and web services (http).		ORD section 4.a.3
4.3	BNIDS/NS: Security	Shall provide security: The architecture is designed to comply with the Defense in-depth strategy. WAN Boundary protection will be provided by the NOC or base firewalls. Individual platforms will provide enclave protection by utilizing router access control lists and proxy services. User level security is provided through WinNT.		ORD section 4.a.3.a

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ISNS RTM Cont.

4.4	BNIDS/NS: Proxy	Provide proxy services for HTTP and FTP traffic.		ORD section 4.a.3.b
4.5	BNIDS/NS: INM	Provide integrated network management capability.		ORD section 4.a.3.c
4.6	BNIDS/NS	Must be capable of providing a robust, flexible networking environment utilizing COTS/GOTS equipment and network protocols as specified by the JTA, version 2.0.		ORD section 4.a.2
4.7	BNIDS/NS			
4.8	BNIDS/NS			
5.1	Bandwidth Utilization			
5.2	Bandwidth Utilization			
5.3	Bandwidth Utilization			
6.1	System Integration & Interface (SI&I):			
6.2	SI&I:			
6.3	SI&I:			
7.1	Performance Parameters: Fail-over Server Access	Provide fail-over server access in the event that one of the two domain controllers fail. Threshold: 3 min. / Objective: 30 sec.		ORD table 4.1
7.2	Performance Parameters: Fail-over LANE services	Provide fail-over LANE services in the event that on e of the two Multi-Protocol support servers fail (ATM backbone based networks only). Threshold: 2 min. / Objective: 1 sec. (section 5.1 p.14 of SPAWAR ISNS ATM test report)		ORD table 4.1
7.3	Performance Parameters: File Transfer	Time taken for two NT workstations to transfer files to each other via the shipboard ATM network (ATM backbone based networks only) 20 Mb file Threshold: 4 min / Objective: 5 sec.		ORD table 4.1
7.4	Performance Parameters: File Transfer	Time taken for two NT workstations to transfer files from one of the NT servers via the shipboard ATM network (ATM backbone based networks only) 20 Mb file Threshold: 4 min. / Objective: 1.11 sec.		ORD table 4.1
7.5	Performance Parameters: Bandwidth	Average bandwidth utilization of the link between the servers and the ATM backbone switch over the period of 24 hours. (peaks may exceed threshold for no more than 5 seconds) Threshold: <66% / Objective: <33%		ORD table 4.1
7.6	Performance Parameters:			
7.7	Performance Parameters:			
8.1	Other System Characteristics: EMC and EMI	Meet the applicable requirements of MIL-STD-461, Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility.		ORD section 4.c.1
8.2	Other System Characteristics: Interfaces	The system must be interoperable with ADNS and backside "customer" tactical and non-tactical applications. Data control interfaces must comply with the standards specified by JTA, version 2.0, except where necessary to interface with existing legacy systems and equipment.		ORD section 4.c.2
8.3	Other System Characteristics: Scalability	Shall be scalable physically, as well as in capabilities and capacities, for installation in small surface platforms, large surface platforms, and submarines.		ORD section 4.c.3
8.4	Other System Characteristics:			
8.5	Other System Characteristics:			
9.1	Integrated Logistics Support/ Logistical Readiness (ILS/LS): Repair	Battle damage will repairs shall be capable of being effected through replacement of system Lowest Replaceable Unit (LRU) assemblies from On Board Repair Parts (OBRP's)		ORD section 4.b

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ISNS RTM Cont.

9.2	ILS/LS: Maintenance	All (O) level maintenance and LRU replacement shall be able to be performed by a Navy Electronics Technician Third Class (E-4) or above who has successfully completed the initial (factory) ISNS maintenance training course and the ISNS System Administrators course.		ORD section 4.b
9.3	ILS/LS: Operation	The system will be capable of being operated by a Radioman Second Class (E-5) or above having successfully completed the initial (factory) ISNS System Administrator course or possessing one of the following NEC's: Advanced Network Analyst (NEC 2718) or Information System Administrator (NEC 2735)		ORD section 4.b
9.4	ILS/LS: Maintenance and Planning	SPAWARSYSCOM will establish the spares control point. The range and depth of requirements for OBRP's will be calculated by the Naval Inventory Control Point, Mechanicsburg (NAVICP-M), or the Naval Sea Logistics Center, NAVSEALOGCEN) Mechanicsburg using authorized Navy allowance computation models.		ORD section 5.a par. 2
9.5	ILS/LS: Training, Manpower, and Personnel	Operator/Maintainer training for the ISNS will be provided for both East and West coast system installations at SPAWARSYSCOM field activity sites until Navy Ready for Training (RFT) is achieved. At this time ISNS training will consist of pipeline, battle group readiness delta training, and installation training. Implementation of ISNS must not result in any net increase in ship manpower.		ORD section 5.c
9.6	ILS/LS: Computer Resources	Shall be designed to incorporate computer resources using an open system approach. The selection of open interface standards and computer resources products shall follow a thorough systems engineering process that includes the balancing of acquisition requirements (cost, competition, market availability, commercial standardization, maturity) with system requirements performance, including logistics supportability, military environment, configuration management, interoperability, security). COTS/GOTS hardware/software will be used to the maximum extent possible.		ORD section 5.d
9.7	ILS/LS: Logistical Considerations	In accordance with DOD Directive 5000.2, Mandatory Procedures for Major Defense Acquisition Programs (MDAP's) and Major Automated Information System (MAIS) Acquisition Programs, the ISNS program shall incorporate environmental planning into all aspects of its management strategy, beginning at the earliest stages and extending through the full program life cycle.		ORD section 5.e
9.8	ILS/LS: Logistical Considerations	Identify legislative and regulatory environmental requirements; assessment of system safety, health hazards, and environmental needs; consideration of alternative ways of meeting program requirements that are most environmentally sensitive; and commitment to mitigation measures.		ORD section 5.e
9.9	ILS/LS: Logistical Considerations	Shall comply with Continuous Acquisition and Life-cycle Support (CALS) specifications and standards approved within DoD for creation, use management of all technical and other data in digital form.		ORD section 5.e
9.10	ILS/LS: C4I	Provide basic network management and information distribution services for C4I systems entry into the Defense Information Infrastructure (DII) Common Operating Environment (COE).		ORD section 5.f
9.11	ILS/LS: Transportation and Basing	Although most ISNS installations will be permanently installed, a tactical mobile configuration must be provided that is transportable by air, sea, and land.		ORD section 5.f
9.12	ILS/LS: Standardization, Interoperability, and Commonality	Must be developed and implemented in accordance with the DII COE, JTA version 2.0, SECNAVINST 200.32a, Acquisition Management Policies and Procedures for Computer Resources; and DoD Intelligence Information System (DoDIIS) standards. This approach is to enable integration with other DoD C4I systems and facilitate interoperability among Naval, Joint, Combined, and Allied forces.		ORD section 5.h par. 1

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ISNS RTM Cont.

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ISNS RTM Cont.

9.13	ILS/LS: Standardization, Interoperability, and Commonality	Components shall be compatible with the infrastructure of the facility in which they are installed (power supply, interior environment controls, space and weight, shock/vibration/sway mounting, accessibility, fire prevention, susceptibility to foreign-electromagnetic interference, TEMPEST, dust, insects, etc…)		ORD section 5.h par. 2
9.14	ILS/LS: Standardization, Interoperability, and Commonality	Shall be comply with the requirements of DoD directive 4630.5, Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence (C3I) systems, and DoD Instruction 4630.8, Procedures for Compatibility, Interoperability, and Integration of C3I systems. A Joint Potential Designator (JPD) of "Joint Interest" is assigned to this program.		ORD section 5.h par. 3
9.15	ILS/LS:			
9.16	ILS/LS:			
10.1	Joint Communications			
10.2	Joint Communications			
10.3	Joint Communications			
10.4	Joint Communications			
11.1	Force Structure	IS[illegible] will be installed on the ships of the following classes in the following estimated quantities: AGF: 2 AOE: 8 ARS: 4 AS: 2 CG: 27 CVN/CV: 12 [illegible]A: 5 LHD: [illegible] [illegible]PD: [illegible] L[illegible]7 LCC[illegible] DD: [illegible]2 DDG: 21 FFG: 25 MCM: 10 MCH: 1 [illegible]CS: 1 PC[illegible]4 TAE: 7 TAO: 12 TAGOS: [illegible]	ORD section 6
11.2	Force Structure			
11.3	Force Structure			
11.4	Force Structure			
12.1	Schedule Considerations			
12.2	Schedule Considerations			
12.3	Schedule Considerations			
Non-Valid Requirements				
13.1				
13.2				
13.3				

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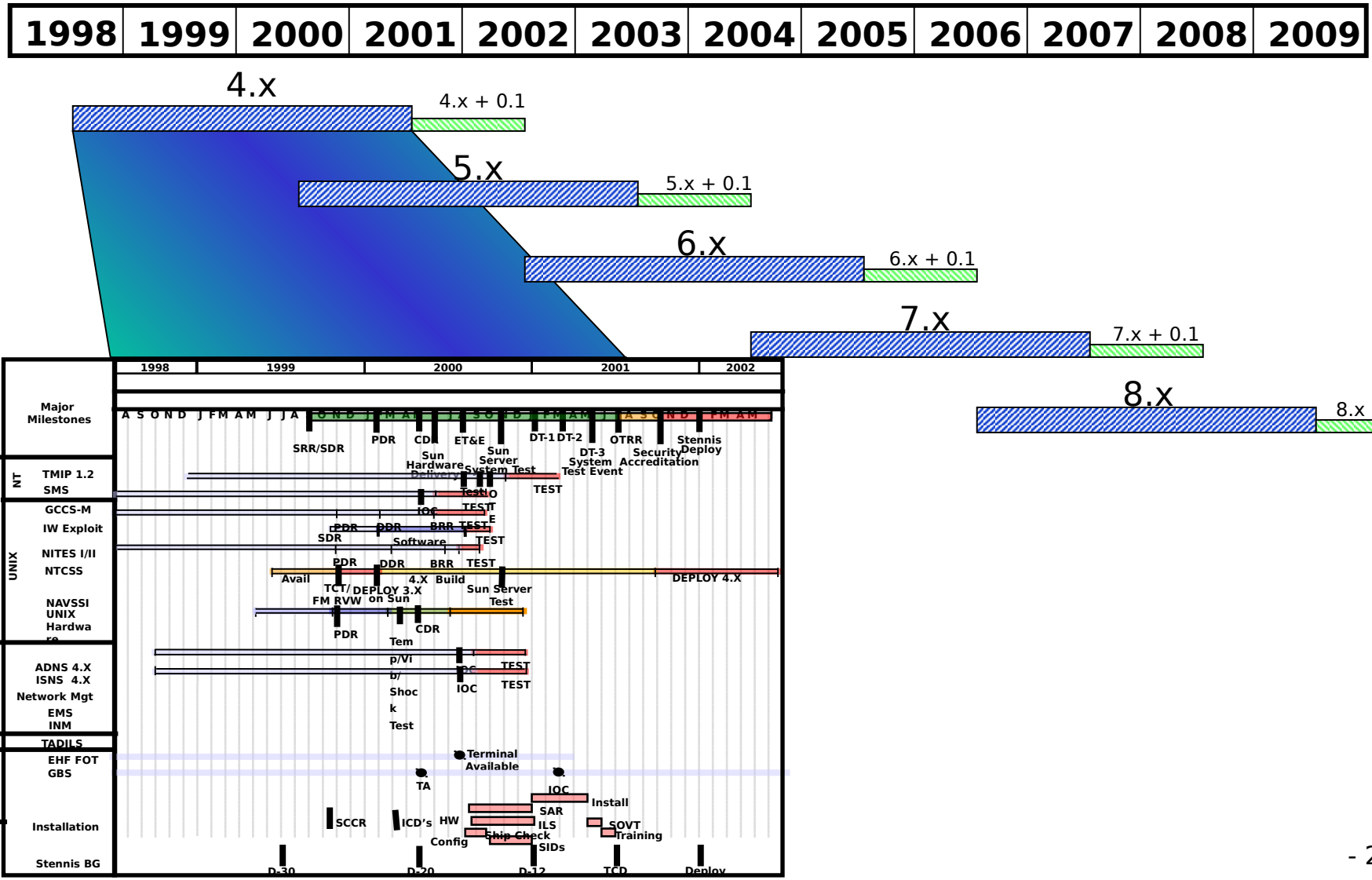
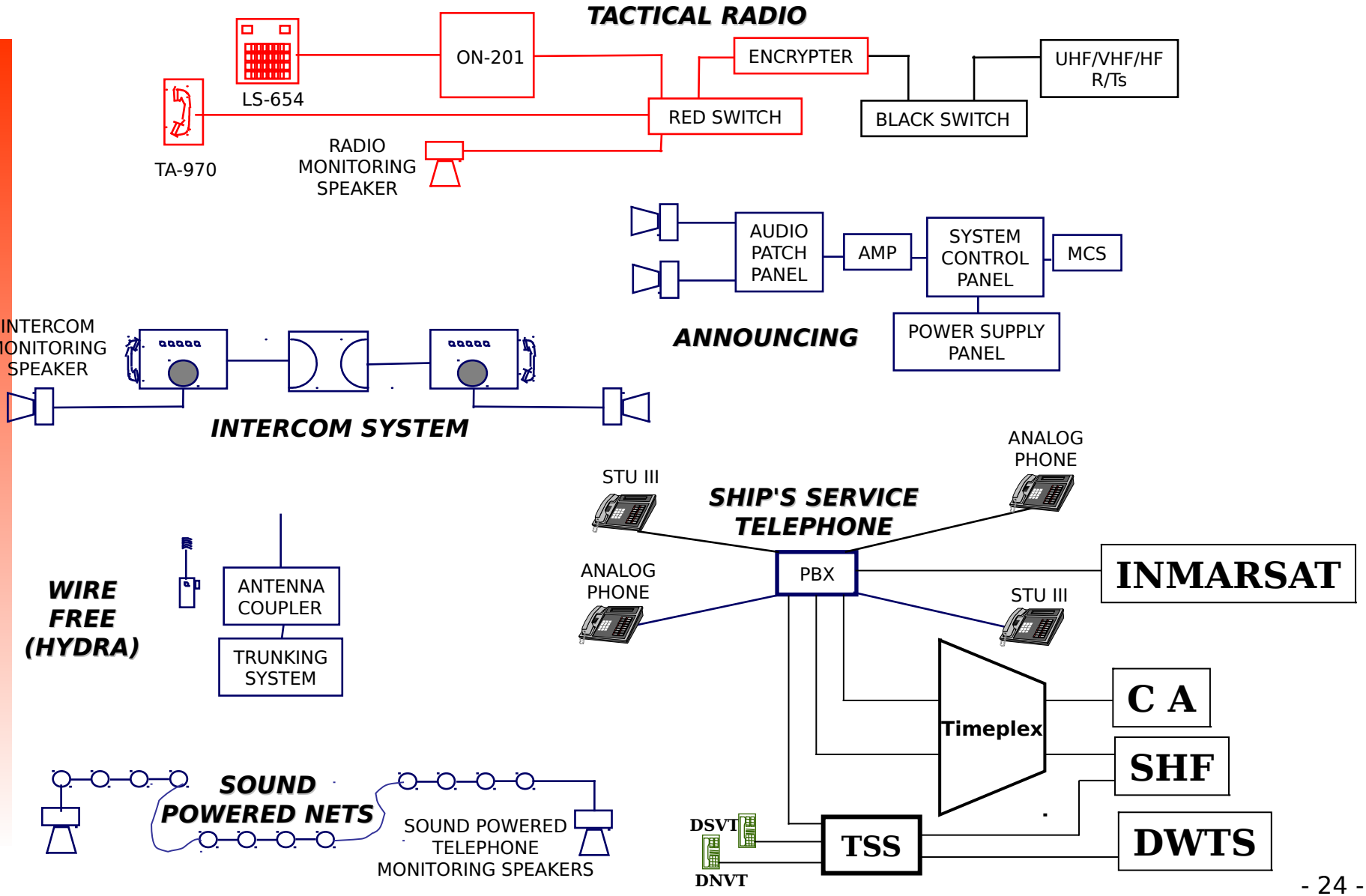
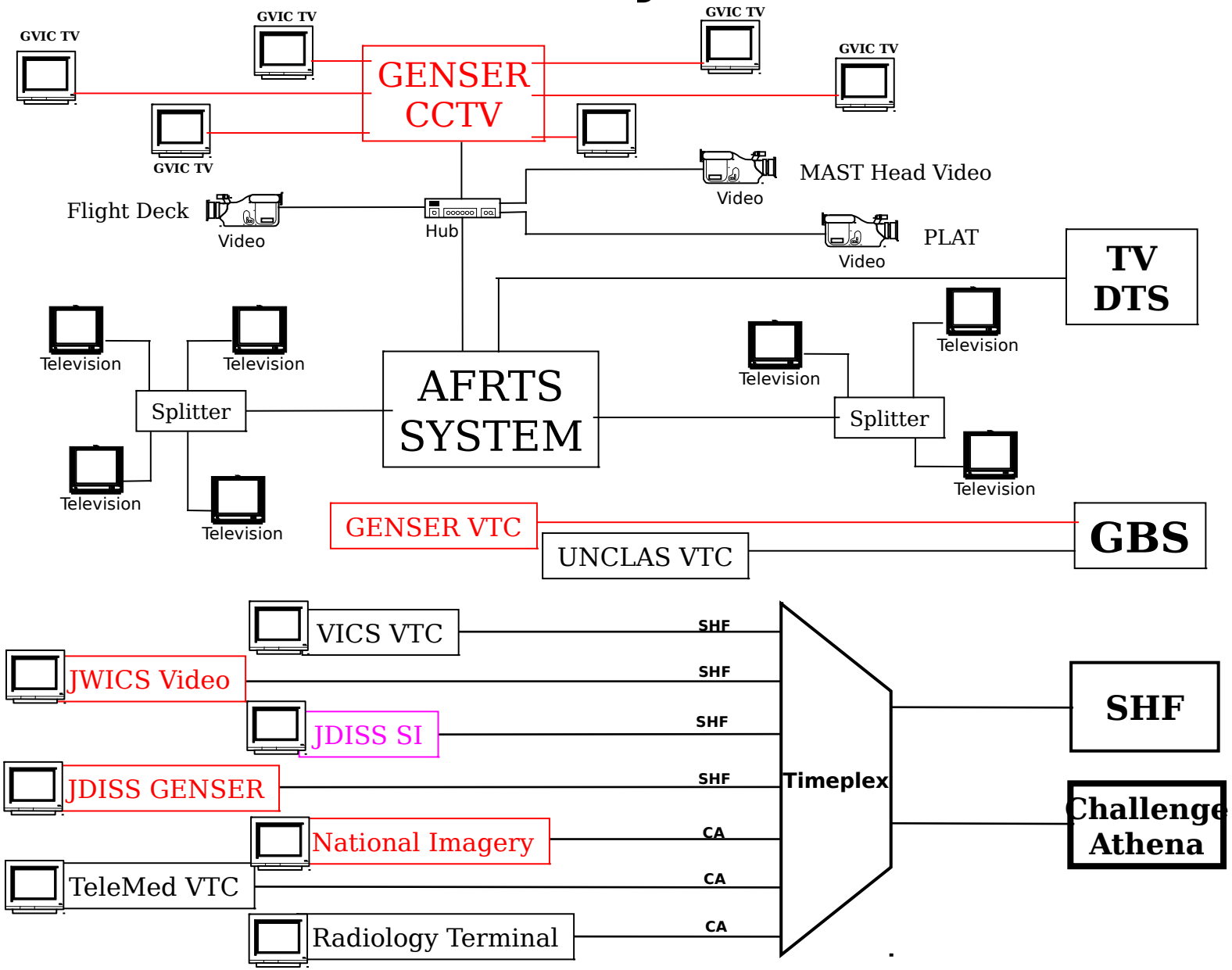
HI Version Y.x Schedule



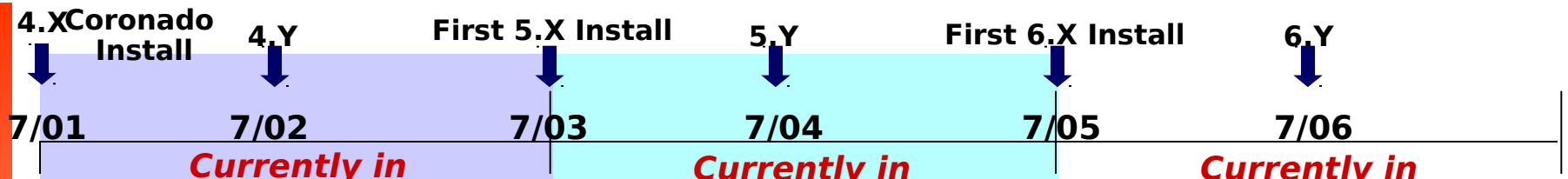
Independent (STOVE PIPED) Voice Systems



Independent (STOVE PIPED) Video Systems



HI is the Vehicle for SPAWAR Implementation



Currently in Design Phase

APPLICATION LAYER
- >150 Functional/Capability Upgrades
- New track sources (IIB Phase 1)
  - RJ, JSTARS, TIBS/IBS
- DII COE 4.X
  - COP at every PC
  - point and click applications
- New Weapons Systems Interfaces
- Consolidated Enterprise Servers (SUN)
- Consolidated Help Desk
- Initial NT Client Migration for GCCS-M, & METOC
- ISR Upgrade
  - SRMT, New signal analysis, I3

NETWORK LAYER
- Survivability Upgrade
  - Redundant & Survivable Servers
- Integrated HM&E
- SCI, Genser, Unclass, and USMC Networks
- Network Management Upgrades

TRANSMISSION LAYER
- Bandwidth Increase
  - GBS, DMR, EHF MDR, SubHDR

Currently in Definition Phase

APPLICATION LAYER
- TBD Functional Upgrades
- Full NT Client Migration
  - GCCS-M, METOC, IW Exploit
- Combat Systems Integration
  - Trackfile exchange upgrades
- IIB Phase 2
- Real Time OS/DII COE 5.X
- Space ISR Upgrade
  - SBIRS, SRMT
- Airborne ISR Upgrade
  - UAV's, F/A-18G
- COP "Refresh" Upgrade Focus
- Embedded Training Focus
- Integrated Security upgrade

NETWORK LAYER
- Wireless Networks
- Integrated Voice
- Remote Monitoring

TRANSMISSION LAYER
- Bandwidth Increase
  - Advanced UHF
  - DSCS/E

Currently in Concept Phase

APPLICATION LAYER
- TBD Functional Upgrades
- DII COE at Tactical Displays
- In-flight Strike" Support Focus
- Rapid Targeting Support

NETWORK LAYER
- Remote management
- Combat Systems Integration
- Air Systems Integration

TRANSMISSION LAYER
- Bandwidth Increase
  - Advanced EHF
  - GBS Phase 2
  - Commercial SATCOM Upgrades
  - Joint Tactical Radio (JTR)
  - MILSATCOM LEO-MEO
- Antenna Upgrades
  - KIRIS
  - MERS